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5 December 1996

Hon. Reed E. Hundt, Chairman
Federal Communications Commission
1919 M. St.
Washington DC 20554

Dear Mr. Chairma FCC Request for Comments of 27 November 1996, MM Docket 87-268

Enclosed are my Comments with respect to the agreement of 27 November 1996 among the Broadcasters Coalition, CEMA, and CICATS. As you will see, I recommend that this agreement be rejected as not in the public interest. I sincerely hope that the Commission will find the will to decide on a set of standards for digital television broadcasting that is in the interest of the whole country, and not just in the perceived short-term financial interests of certain of the interested parties.

Another matter that is of concern is the apparent violation of the Federal Advisory Committee Act (FACA) in spirit, if not in letter. I believe this act was promulgated with the intention of preventing precisely the kind of process that has gone on in the several weeks leading to this Agreement.

This Request for Comments arises out of the agreement between certain parties pertaining to the pending decision by the Commission about digital TV standards. The parties in question are reported to have met at the urging of Commissioner Ness. The resulting proposal is evidently being taken very seriously by the Commission, in that Comments have been requested within an extremely short period of only 9 days. (I cannot recall any previous case in this Docket in which Comments were asked regarding a submission by private parties.) If the Commission adopts the principles of the agreement, the group will have constituted an "advisory committee" as that term is commonly understood.

FACA exists to avoid the undue influence of groups with restricted membership on federal policy. It requires such federal advisory committees to represent all interested parties and to conduct its meetings in public. In this case, the public was not represented, the meetings were held in secret, and the parties involved agreed to keep their negotating positions confidential, even after the close of the meetings.

This law is not a mere technicality. It is based on the wise premise that public policy not made in public is likely to be bad policy. Federal officials should bend over backward to conform to the spirit as well as the letter of this law. We all recall the battle over health-care reform and how it was exacerbated by secret meetings of interested individuals who did not represent all interested parties.

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As an example of the public interest in the pending decision, there is the question as to whether the digital receivers first placed on the market will continue to be usable as the system evolves over time. (The Commission has very wisely called for "nondisruptive" improvement over time.) This matter was not addressed in the Grand Alliance proposal as documented by ATSC. It is also not addressed in the current agreement. Actually, if the Commission adopts the proposal and makes no rule at all about broadcast standards, the public is likely to be protected even less than under the GA plan. The only positive thing that can be said about the process is that it may permit the Commission to act without setting off a firestorm of protest.

It is no secret that regulatory agencies always hope that the industries to be regulated will agree on the regulations beforehand. However, the Commission has the legal and moral obligation to protect the public interest. Getting the relevant industries to agree does not help at all in carrying out this obligation.

Sincerely,

William F. Schreiber

Cc:
Commr. James H. Quello
Commr. Rachelle B. Chong
Commr. Susan Ness
Hon. Edward J. Markey
Mr. Richard E. Wiley
Mr. Larry Irving
Dr. Robert Pepper, FCC
Other interested parties

Executive Summary

The Agreement of 27 November 1996 should be rejected. The failure to set specific broadcast standards and the subsequent uncertainty as to what formats will be used by broadcasters and manufacturers is not in the public interest. It is likely to cripple the development of digital broadcasting. Such investments as are made by industry and the public in this case would probably be lost. Alternatively, the Commission could exercise its right to formulate the standard on its own, with or without the advice of *an expert panel, the members of which ought to have no financial interest in the outcome.*

As alternatives to adopting the Agreement, the Commission could adopt the ATSC standard without change, could modify the standard by eliminating the interlaced formats, could loosen the standard by permitting a range of formats that are multiples of 144x256 in spatial resolution and multiples of 12 fps temporally, both up to some reasonable limit, with or (preferably) without interlace, or could adopt a layered scheme with only two base formats: 480 interlaced at 30 fps and 480 progressive at 24 fps for film. Higher quality, including progressive scan, would then be achieved by using one or more enhancement data streams. The base data stream, directed to the original receivers, would remain unchanged. This last alternative, which represents a very large concession to TV interests, also would result in the lowest-cost initial receivers, and would guarantee nondisruptive improvement over time.

These various possibilities would be acceptable or not in different degrees by the computer and TV interests represented by the signatories of the agreement. If none of these approaches is acceptable, then the move to digital broadcasting should be abandoned.

The Commission is acting within its power to set a standard that it believes to be in the public interest; it need not pander to any particular groups, particularly groups motivated by their perceived short-term financial interests. My own opinion is that the public interest would best be served by eliminating interlace, either at the outset or as soon as possible, and by mandating that system improvements be implemented solely by transmitting enhancement information in a separate data stream, leaving the original data stream, directed at the original receivers, unchanged. This last matter is discussed in the Appendix.

Before the Federal Communications Commission
Washington DC 20554

In the Matter of
Advanced Television Systems
and Their Impact upon the
Existing Television Broadcast Service

MM Docket 87-268
Request for Comments of 27 November 1996

Comments of

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The opinions in these comments are those of the author only. He has no financial dealings with any computer company. Since his retirement in 1990, the author has had no role in directing MIT's Advanced Television Research Program.

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1. Introduction

These comments are directed at the agreement on DTV standards contained in the letter of 27 November to Commissioner Ness, signed by representatives of the Broadcasters Caucus, CEMA, and CICATS, hereinafter referred to as the "Agreement." The evaluation of this proposal is best done by attempting to judge the degree to which the Agreement advances the Commission's objectives in this proceeding. As has been indicated many times since its inception in 1987, these objectives include protection of the public interest, the rapid adoption by the TV industry of digital broadcasting, and the rapid proliferation of digital receivers in the hands of viewers so that NTSC can be turned off as soon as possible. The principal reason for phasing out NTSC is so that the spectrum can be used for more efficient, important, and profitable applications that the public is expected to want.

Another element in the Commission's deliberations is interoperability of the new standards with computers. The desirability of this property was recognized early in the proceedings and some steps have been taken in that direction, mainly the inclusion in the ATSC standard of a number of progressively scanned (P) formats in addition to the interlaced formats (I) that are preferred by some TV interests. The large number of formats included in the ATSC standard has led to a number of negative comments. (The use of many formats would certainly raise the price of receivers, most noticeably that of the cheapest receivers.) The advocates of the system have expressed confidence that all receivers will be able to cope with all of the formats, although they do not have the power to enforce this rule. Only regulation by the US government could do this, but the FCC has so far shown little desire to go this route. The very successful use of government regulation embodied in the All-Channel Receiver law has been cited by many as a good model for this case.

My own opinion is that the multiplicity of formats in the ATSC standard is the direct result of the shotgun wedding that everyone believes was forced on the several system proponents by the Advisory Committee. (No one gave up any format, so all were included.) Another contributing factor is that enthusiasm for HDTV has waned and most prospective broadcasters are likely instead to transmit multiple standard-definition programs in each channel; hence the SDTV formats. I believe that many of the defects of the Agreement are likewise caused by the pressure on these parties to make a joint proposal. Unfortunately, the public was omitted from the discussions, as a result of which the public interest has been inadequately protected.

The best aspect of the Agreement is that none of the parties will object should the Commission adopt it, provided that it does so by 31 December 1996. By itself, such action does not ensure a successful outcome. It should be kept in mind that the Commission's program for launching DTV depends on loaning each broadcaster a second channel. This route, which I strongly support, is in danger in Congress, with its concern about budgets. The proviso in the Agreement that data broadcasting is a proper use is likely to raise a red flag in Congress. We may recall the Congressional reaction to the quickly abandoned NAB proposal that the second channel should be usable for any application at all, with no obligation to do any HDTV, or even television.

The Commission need not be a prisoner of the signatories of the Agreement, either as to the

content of the standards or the date of their promulgation. There is no question that the FCC has the power to set broadcasting standards, and it should do this with its own interpretation of advancing the public interest, for example by ensuring that the receivers first placed on sale should be usable for a minimum period, such as ten years. It has exercised due diligence in this proceeding and there would seem to be little legal ground for objections. While it would have been highly desirable to get the regulated industries to agree beforehand, this is not a sufficient reason for disregarding the public interest.

2. Questions About the Agreement

The Commission very early, and quite properly, established nondisruptive improvement over time as an objective of the standards. I assume that this means that the initial equipment should be usable as the system evolves over time. Yet here we have a proposal that the basic TV formats -- samples/line, lines/frame, and frames/sec, not to mention aspect ratio and I/P scanning -- are to be omitted from the standard entirely. A situation in which the prospective purchaser of a TV receiver cannot even know whether it is usable with all the current formats, let alone formats that may be used within the next few years, can hardly be judged to be in the public interest.

The television parties to the Agreement evidently believe that all receivers on sale will in fact work with all the formats that will be used by broadcasters. Without being privy to the secret negotiations just concluded, it is hard to see how the computer industry, which fought so hard to get rid of the famous (or infamous) Table 3,[1] will be any further advantaged by its elimination than its inclusion if, in fact, the same situation will prevail in either case. Evidently the TV lawyers and the computer lawyers did not have a meeting of the minds on this point.

No party to the agreement has the power to force broadcasters and receiver manufacturers to adhere to the formats of Table 3. If digital broadcasting were already in place and a large number of broadcasters and consumers already equipped, we might expect market forces to ensure continued compatibility. With the service not yet started, we can look at the satellite situation for guidance as to what may happen. With 3 million set-top boxes in existence (only 10 million receivers were in existence when compatible color was introduced into NTSC) we already have a great deal of incompatibility, in addition to which none of these boxes will do progressive scan or HDTV. The computer lawyers may have been right; eliminating Table 3 may well eliminate many of the formats. Actually, there is nothing wrong with the progressive formats or with the 24 fps P format for film, and it would be a shame to see them fall by the wayside as a result of adopting the Agreement.

Since employing all of the formats will without doubt raise the cost of receivers (even the cheapest receiver will require a complete HDTV decoder) it is highly likely that some manufacturers, seeing a cost advantage, will produce receivers that will not deal properly with some of the formats. Barring regulation by the Commission, or at least labelling under the auspices of CEMA, the public will have no way of distinguishing these receivers from those that do adhere to Table 3. This is the Gresham's Law of TV standards to which I referred in one of my earlier filings. It is

[1] included in section 5.1.2 of ATSC Doc. A/53, 16 Sept 95

precisely how we should expect unregulated markets to work.

Another sure consequence of uncertainty about formats, once the problem becomes noticed by the public, will be to slow down the penetration of digital receivers. Unless a large number of such receivers are in the hands of the public at the time, it will prove politically impossible to shut down NTSC. In order to achieve the higher spectrum efficiency made possible by the digital formats[2] NTSC must be turned off, and the spectrum must be given back to the Commission for reassignment. If this does not happen, then there will have been no valid reason for making any change at all in terrestrial broadcasting standards. This change will cost at least $100 billion; we have many other things on which this money could usefully be spent, particularly if the expenditure proves to have been in vain.

3. Possible Alternatives to the Agreement

Even though the Agreement was eagerly sought by the Commission, when the likely effects of its adoption are fully appreciated, it may be motivated to look at some of the possible alternatives.

Adopt the ATSC standard as is. This implies that the formats of Table 3 will be enforced, at least on broadcasters. While market forces might be relied upon to ensure the usability of receivers, a very good case can be made at least for labelling receivers as completely or partially conforming to the standard. The computer interests are sure to complain, the most likely avenue being a lobbying campaign in Congress to abort the granting of free licenses for the second channel. This complaint may well succeed. My own view is that all profit-making entities that rely on the use of the publicly owned spectrum ought to pay rent for its use. If such a reform were enacted, it is likely that the payments for the second channel would not be oppressive, especially if tailored so as to encourage digital TV broadcasting, or if waived for a certain number of years.

Adopt the standard, but eliminate the I formats. This would probably mollify the computer people, but would enrage some TV interests.[3] However, once the arguments were properly presented, I believe that the I advocates would lose in Congress, the courts, and in public opinion. I sincerely hope that the Commission will gather the resolve to take this course.

Loosen up the ATSC standard to permit a wider variety of formats, including I formats. This would meet some, but not all, of the computer industry concerns, as well as those of the Hollywood group that has been advocating a very wide-screen system. If receivers are made capable of handling all the Table 3 formats, they can just as easily, and at no extra cost, handle any format that is a multiple of 144x256 in spatial resolution and 12 frames/sec temporally, both up to some reasonable limit. If the TV people are guided by logic, and not by the self-serving arguments of those who have interlaced products all ready for sale, this arrangement ought to suit them as well as that of the Agreement.

[2] Equally high spectrum efficiency can be achieved with hybrid/analog digital formats, but that is not an issue at present.

[3] The computer industry is unanimously against interlace, but the TV industry is split. The argument for "progressive scan only" is extremely strong; interlace is being pushed primarily by companies that have unwisely invested in this obsolete technology, most of which are foreign-owned.

Adopt a layered approach with only two standard-definition formats. If the base layer were 480 I at 30 fps and 480 P at 24 fps, all parties might well go along without complaint, once they thought about it. If the Commission also mandated upgrading only by sending a second data stream for enhancement, the public would also be protected. I must say that this is a great concession to some of the TV people, who, in my opinion, are quite wrong-headed about interlace, but it might be worthwhile if it would permit final FCC action without further delay. The 480 I 30-fps signal (and probably the 480 P 24-fps signal as well) could be sent at 2-VSB in the same bandwidth rather than 8-VSB, with a correspondingly lower threshold SNR and correspondingly larger service area. HDTV or multiplexed SDTV programs would require enhancement data. Such enhancement information could be sent in a separate data stream by the method indicated in the Appendix, so that 480 P and higher-resolution formats could be available from the beginning. This approach also would substantially reduce the cost of the cheapest receivers, since the required processing speed and amount of memory would only be between 1/4 and 1/2 of that required for single-stream HDTV capability.

Appoint a committee of experts having no financial interest in the outcome. This was the approach advocated by the *NY Times* in a recent editorial. (In my opinion, this is the best approach.) One important reason why a reasonable solution has not already emerged is that most of those involved in the discussions are bound to adhere to the current views of their companies or clients, right or wrong. Hardly anyone seems to appreciate that all parties would eventually do best with a system that is rapidly accepted by broadcasters and the public. Instead, many parties are looking out primarily for their perceived short-term financial interests. Even those totally devoted to a free-market philosophy will admit that it is possible, at least in TV and computers, for many people to be wrong at the same time. We all remember when the TV industry was virtually unanimous in promoting a compatible approach to HDTV -- an approach that turned out to be physically impossible. On the other side, many computer people once thought that closed systems were likely to be more profitable than open systems -- a view that no one holds today. I am convinced that an experts' committee could come up with a solution that would be good for everyone in a relatively short time.

4. Conclusions and Recommendations

4.1 As desirable as it may be for the industries that are to be regulated to agree in advance on a set of acceptable regulations, it is my opinion that *the Agreement should be rejected as not in the public interest.* Actually, I believe it is not in the interest of the industries in question, either, but in this case I am taking a long-term view that is no longer fashionable.

With respect to the public interest, there are two related and important questions: Can the public be ensured that the first digital receivers that they buy will continue to be usable for all digital broadcasts for a reasonable time, such as ten years? What decisions by the Commission are more likely to promote the rapid penetration of digital receivers so that it will become politically feasible to turn off NTSC? At the very least, to achieve both these ends, *I recommend that the Commission either mandate the permissible transmission formats in sufficient detail so that receiver manufacturers can make conforming receivers, or that receiver capabilities be defined so that broadcasters can be assured that what they send out can be received.* If the second approach is

taken, then I prefer requiring receivers to comply with the standard, but, as a second choice, labelling might be used instead. I advocate this action regardless of what other actions may be taken in adopting a standard, for example using one of the approaches discussed below.

4.2 With respect to the other issues, *I have previously advocated the appointment of a panel of experts with no financial interest in the outcome to advise the Commission.* I still think that this is the best approach, since I believe that a solution that would be acceptable to all parties, and that would promote the rapid acceptance of digital broadcasting, could promptly be put together using data that is already available. The main obstacle to evolving such a scheme is that heretofore the parties to the discussions have been concentrating primarily on their own short-term financial interests which are perceived, rightly or wrongly, as different by the different industries.

4.3 If the Commission is unwilling to appoint such an expert panel and to accept the six months or so it would require to put together a recommendation, then I believe that *the ATSC standard should be adopted for the most part.* As recommended in my filing of 9 July 1996, *the ATSC proposal should be changed so as to eliminate the interlaced formats and to permit spatial resolutions that are multiples of 144x256 and temporal resolutions that are multiples of 12 fps, both up to some reasonable limit.* In addition, improvements in the initial formats should be permitted only by sending a second data stream. This action would not be received well by some TV interests, but almost all other parties would like it.

4.4 If the Commission feels that no action is possible unless interlace is permitted in the initial formats, then *I (reluctantly) propose that only two formats be permitted in the first instance. These would consist of 525 I, 30 fps (NTSC scanning format, 480 active lines) and 480 P at 24 fps for film, to be transmitted at 4-QAM or 2-VSB.* All higher formats should be transmitted by sending one or more enhancement data streams. e.g., by the method discussed in the Appendix. A specific format of enhancement data to achieve 480 P at 60 fps might also be included in the standard. This would surely satisfy most of the TV interests and ought to satisfy most of the computer people as well. It would also minimize the cost of the cheapest receivers and speed up the adoption of digital broadcasting.

4.5 If none of these courses of action can be chosen, then I recommend that the transition to digital terrestrial broadcasting be abandoned for the reason that the benefits are not likely to be justified by the costs.

Appendix: Migrating to Progressive Scan

Summary

One important objection to the use of interlace in digital TV broadcasting is that it makes it difficult to improve the system nondisruptively at a later date, for example by moving to progressive scan, without making early receivers obsolete and/or without compromising the degree of improvement that can be attained. In this note, a scheme is presented that gets around this difficulty. The method requires all improvements to be made by sending an enhancement signal in addition to the base signal intended for early receivers, while keeping unchanged the base-signal characteristics that are essential for the continued usefulness of the initial equipment. A second aspect of the scheme is a method of transmitting the enhancement signal without requiring additional spectrum. Note that the difficulty of non-disruptive improvement over time is not the only objection to the use of interlace; the method described here would not alleviate any of the other problems.

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Nearly all parties involved in the FCC process to promulgate standards for digital terrestrial television broadcasting (DTV) agree that progressive scan provides better quality and that the system should eventually migrate to all-progressive. The interlace advocates say that this is not practical at present while the progressive advocates, such as myself, fear that if interlace is permitted, it will be very difficult to eliminate interlace at a later date in a "nondisruptive" manner.[1] The FCC has already made (in my view a very sound) decision that upgrading must be nondisruptive, which I assume means that the initially installed professional equipment and receivers may continue to be used after the system is upgraded. The basic problem in implementing this principle is that there appear to be few improvements that can be made to the current MPEG-2 compression scheme that might be handled by the first DTV receivers.

I have not changed my opinion about the practicality and desirability of starting digital broadcasting with an all-progressive system. However, in the event that the FCC cannot be convinced to do this, here is a way to add information to an interlaced transmission to produce a progressive (P) transmission that could be received on enhanced receivers, while the original interlaced transmission (I) would continue to be receivable on I-only receivers. It may be of some value in the ongoing P-vs-I debate.

The scheme has two elements. The first restricts improvements to the system only to those that are implemented by adding one or more enhancement signals that would be detected and used on improved receivers. The base signal, directed at the early receivers, would never be changed in such a way as to make the original equipment obsolete. (To ensure continued usefulness of the initial equipment, the FCC would have to mandate this last proviso.) The second element of the scheme relates to transmitting the enhancement signal(s) by adding it/them to the base signal

[1] The many reasons for this are given at length in my various submissions to the FCC this year. Copies can be requested from dmanning@image.mit.edu.

within the 6-MHz channel in such a way that it/they can be detected by improved receivers, but would look like random noise to the original receivers. The method bears some relationship to the multiresolution hybrid analog/digital system developed by myself and my two recent PhD students, Susie Wee and Mike Polley. [1] It also uses an element from the now-abandoned ACTV compatible EDTV system developed at Sarnoff Labs. [2]

In ACTV, of which Michael Isnardi, one of my former students, was a principal architect, several enhancement signals were hidden within the NTSC signal so that they could be added to the recovered NTSC video in enhanced receivers to produce a wide-screen P image of improved spatiotemporal resolution. One of these was a "helper" signal that filled in the missing lines to convert I to P. It was only 750 KHz wide because of the limitations of what can be hidden within NTSC.

This method starts with a high-resolution P signal, of, say, 1080 lines, 60 frames/sec. (Actually, any high-quality progressive format can be used.) An I signal suitable for display on an interlaced receiver is derived from the starting signal by filtering and subsampling. The result is the base signal that is to be transmitted to I receivers. The design of these receivers would not have to take the enhancement method into account; indeed, the start-up of digital broadcasting would not have to be delayed until all details of the enhancement format had been worked out.

The base signal is now upconverted to P (and to the spatial resolution of the starting signal) by any means simple enough to be used in an enhanced receiver, and is then subtracted from the original P signal. The difference is the helper signal, which is then coded and transmitted along with the coded I signal. I receivers sense only the I signal; enhanced receivers use both the I signal and the helper signal. This will be recognized as a form of pyramid coding, [3] sometimes called layered coding.[2]

At the enhanced receiver, the decoded I signal is upconverted to the format of the original by the same means as used at the encoder. The helper signal is then added to reproduce a version of the original good-quality P signal. At the I receiver, the recovered I signal is used alone.

The helper signal must be transmitted to the enhanced receiver without seriously degrading transmission of the I signal to I receivers. Of course, a second channel can be used for this purpose, but that makes a very unattractive system. A method that works very well is to replace each point in a normal QAM transmission constellation by a small group of four points, producing a nonuniform constellation with two decoding threshold SNRs. At low SNR, only the original constellation is recoverable, the extra signal acting as additive noise in the I receiver.[3] At higher SNR, the net transmission rate is thus increased by two bits per symbol, or about 10 Mb/s in the enhanced receiver. In a VSB system, each level is split into two levels whose spacing is smaller than that in the original signal, increasing the data rate at the enhanced receiver by one bit per

[2]Alternatively, the coded I signal can be decoded before upconversion and subtraction, which permits cancellation of coding artifacts in the base signal by the helper signal. In this variation, it may be helpful to "condition" the decoded base signal before subtraction. See the Wee thesis.

[3]Transmission of a second signal so that it appears as noise on the base signal is an idea with a long and honorable history. One common scheme is to overlay a low-amplitude spread-spectrum signal onto another signal. This idea was also used in the MIT "Noise Margin" Method. [4] The particular method described here was fully proved out in the work reported in [1].

symbol, also about 10 Mb/s. Again, the effective SNR in the I receiver is slightly reduced.

In this method, *no additional spectrum is needed for migration to higher picture quality.* Rather, the channel capacity normally wasted in high-SNR areas in systems that transmit at the same data rate to all receivers in the reception area is utilized to transmit the enhancement data. Those who are too far out to receive the helper signal with a normal antenna can use a special high-performance antenna, perhaps with a low-noise amplifier on the antenna mast.

It is in the second data stream that the helper signal is transmitted. This means that enhanced receivers, either closer to the transmitter, with superior antennas, or with better noise performance — in all cases having higher SNR — produce 1080-line P pictures, while nonenhanced receivers continue to receive 1080-line I pictures. If this method were chosen for the migration scheme, then the simplest kind of early interlaced receivers could be used indefinitely, *even if they had not be designed with upgrading in mind.* This method can also be used to upgrade standard-definition images, either P or I, that are multiplexed in a 6-MHz channel. With a 525I base signal, enhanced receivers could display 525P or more. If desired, a third signal can be added for even higher resolution where the SNR is adequate.

Note that 10 Mb/s is probably more than enough to transmit the helper signal, especially if a good interpolation method is used. That means that a P image of more than 1080 lines may be feasible, or an I signal of less than 1080 lines can be upgraded to 1080P. Horizontal resolution can also be increased by the same method, so that equal horizontal and vertical resolution could be maintained if the line number went over 1080. Other visual enhancements, such as stereo, might be considered.

Since the cost of an MPEG decoder depends mainly on the amount of memory and the processing speed, the cost of the initial receiving equipment can be minimized by choosing the appropriate resolution and frame rate for the initial transmissions. For example, 432x768x60 would provide very fine images — much better that NTSC — with half the memory and speed of 720x1280, while 288x512x30 would be even cheaper. This format might be useful if digital broadcasting were to be introduced in countries where the cost must be very low. *Note that the lower the resolution and frame rate of the base signal, the lower the required transmission data rate, the lower the required receiver SNR at the same bandwidth, and the larger the coverage area, whether noise-limited or interference-limited.* E.g., if the base signal is standard definition, then the threshold SNR is about 6 dB, using 4-QAM or 2-VSB, rather than 16 to 18 dB as in the Grand Alliance system. If the base signal were 525-line I, then the cost in the studio to transmit digitally would be very low, as no transcoding from NTSC would be required.

I am personally very enthusiastic for HDTV. However, neither the terrestrial broadcasters, the satellite people, nor the cable broadcasters have so far shown much enthusiasm, instead preferring to multiplex a number of standard-definition programs in each 6-MHz channel. If little HDTV is to be broadcast, then there is no point in saddling the public with the extra cost of HDTV decoders in every new TV receiver. Those who wished to see whatever HDTV is broadcast could buy the enhanced receivers, while everyone who had a digital receiver would be able to view all the programs.

Nothing in this piece should be interpreted as a change in my view that it would be much better for the country and for the industry — both the TV and the computer industry — if only progressive scan were included in the DTV standards now under consideration by the FCC. In my opinion, interlace is obsolete and has no place in any new television system. However, if the TV industry and the Commission cannot be convinced of this, then the scheme proposed here would avoid the most serious long-range negative effects of permitting interlaced formats at the start of the new service.

This scheme may be covered by existing MIT patents on multiresolution systems. If not, additional US patent protection may be sought within the next year.

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W.F.Schreiber, 17 June 1996, last rev 5 December 1996.
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